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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/542,076

07/13/2005

Kai Eck

PHDE030024US

8935

24737

7590

04/14/2008

PHILIPS INTELLECTUAL PROPERTY & STANDARDS

P.O. BOX 3001

BRIARCLIFF MANOR, NY 10510

EXAMINER

ZEILBERGER, DANIEL

ART UNIT

PAPER NUMBER

2624

MAIL DATE

DELIVERY MODE

04/14/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/542,076	Applicant(s) ECK, KAI	
	Examiner DANIEL ZEILBERGER	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 February 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 9-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 9-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

This office action is in response to applicant's reply dated February 4th, 2008.

The examiner notes that claim rejections for amended claims have been amended accordingly, and claim rejections for new claims have been added.

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. *Claims 17-20* are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

3. Regarding **claim 17**, "wherein the pattern of marking elements are not visibly evident individually in the image without performing an image processing step to remove the pattern from the image" is disclosed. However, the originally filed specification makes no mention of the negative limitation of "without performing an image processing step to remove the pattern from the image". Appropriate correction is required, however for the purposes of examination it will be assumed that applicant did have appropriate disclosure in the originally filed specification.

4. Regarding **claim 18**, "providing the pattern the pattern of marking elements with at least one of a size, a shape, and a material that renders the marking elements not visibly evident individually in the image" is disclosed. However, the originally filed specification makes no mention of a "shape" that renders the marking elements not visibly evident individually in the image. While the specification does mention that a combination of shape, size, **and** material of the marking elements can render them not visibly evident individually in the image (page 7 lines 21-24 of applicant's specification), the specification makes no mention specifically of a "shape" which "renders the marking elements not visibly evident individually in the image". Appropriate correction is required, however for the purposes of examination it will be assumed that applicant did have appropriate disclosure in the originally filed specification.
5. Regarding **claim 19**, the claim similarly contains the same limitation as claim 17 which lacks appropriate disclosure in the originally filed specification.
6. Regarding **claim 20**, the claim similarly contains the same limitation as claim 18 which lacks appropriate disclosure in the originally filed specification.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. *Claims 1, 9, 10, 11, 13, 18, and 20* are rejected under 35 U.S.C. 102(b) as being anticipated by Schuetz (US Patent 6,206,566).

7. Regarding **claim 1**, Schuetz discloses an x-ray apparatus for producing a 3D image from a set of 2D projections. In addition, Schuetz discloses a method of determining the position of an object in an image, the method comprising:

8. Schuetz discloses that the marker plate 19 is constructed of an X-ray permeable material such as plexiglass, and is provided with four X-ray positive spherical marks 20, which are arranged in the marker plate 19 such that they are situated in different image corners, as disclosed in column 6 lines 53-60, and further discloses that should the imaged marks 20' prove disturbing in the 2D projections, the imaged marks 20' can subsequently be calculated out of the 2D projections in an image processing step, as disclosed in column 6 lines 63-67 and column 7 lines 1-2, which reads on claimed "providing a pattern of marking elements that are not visibly evident individually in the image".

9. Schuetz further discloses that the intrinsic imaging parameters, which specify the distance of the X-ray source 9 from the X-ray detector 10, the orientation of the X-ray source 9 relative to the X-ray detector 10, and a possible displacement of the X-ray detector 10 perpendicular to the axis of the center beam ZS of the X-ray beam emanating from the X-ray source 9, are detected using a marker plate 19, wherein the marking place 19 is arranged directly at the X-ray source 19, as disclosed in column 6 lines 44-63, which reads on claimed "attaching the pattern of marking elements to the object that is being imaged".

10. In addition, Schuetz discloses obtaining 2D projections with the X-ray detector, as disclosed in column 6 lines 57-63, which reads on claimed "obtaining the image".

11. Regarding **claim 9**, Schuetz discloses an X-ray system, comprising:

12. an X-ray source 9, wherein a center beam ZS of the X-ray beam emanates from the X-ray source 9, as disclosed in column 6 lines 44-51, which reads on claimed "an X-ray source generating a ray path";

13. an X-ray detector 10, which is in the path of the center beam ZS of the X-ray beam, as disclosed in column 6 lines 44-51 and exhibited in figure 1, which reads in claimed "an X-ray detector which is disposed in the ray path of the X-ray source";

14. the intrinsic imaging parameters, which specify the distance of the X-ray source 9 from the X-ray detector 10, the orientation of the X-ray source 9 relative to the X-ray detector 10, and a possible displacement of the X-ray detector 10 perpendicular to the axis of the center beam ZS of the X-ray beam emanating from the X-ray source 9, are detected using a marker plate 19, as disclosed in column 6 lines 44-63, which reads on claimed "at least one marking device for attachment to an object in order to determine the position of the object in an X-ray image";

15. the marker plate 19 is constructed of an X-ray permeable material such as plexiglass, and is provided with four X-ray positive spherical marks 20, which are arranged in the marker plate 19 such that they are situated in different image corners, as disclosed in column 6 lines 53-60, which reads on claimed "wherein the marking device comprises marking elements";

16. should the imaged marks 20' prove disturbing in the 2D projections, the imaged marks 20' can subsequently be calculated out of the 2D projections in an image processing step, as disclosed in column 6 lines 63-67 and column 7 lines 1-2, which reads on claimed marking elements "which are not visibly evident individually in the X-ray image";

17. the evaluation of the 2D projections is made by the computer 14, which determines the intrinsic imaging parameters using the known geometric positions of the marks 20 in the second coordinate system K2 and the distance relations of the imaging marks 20' in the 2D projections, as disclosed in column 7 lines 12-20, which reads on claimed "a data processing unit for calculation of the position of the marking elements of the marking device in an image generated with the X-ray system".

18. Regarding **claim 10**, Shuetz discloses everything as applied above in regards to claim 9. In addition, Schuetz discloses that the intrinsic imaging parameters, which specify the distance of the X-ray source 9 from the X-ray detector 10, the orientation of the X-ray source 9 relative to the X-ray detector 10, and a possible displacement of the X-ray detector 10 perpendicular to the axis of the center beam ZS of the X-ray beam emanating from the X-ray source 9, are detected using a marker plate 19, wherein the marking plate 19 is constructed of an X-ray permeable material such as plexiglass, and is provided with four X-ray positive spherical marks 20, as disclosed in column 6 lines 44-63, and that should the imaged marks 20' prove disturbing in the 2D projections, the imaged marks 20' can subsequently be calculated out of the 2D projections in an image

processing step, as disclosed in column 6 lines 63-67 and column 7 lines 1-2, which reads on claimed “wherein it is set up to implement a method as claimed in claim 1”.

19. Regarding **claim 11**, Schuetz discloses everything as applied above in regards to claim 9. In addition, Schuetz discloses that the marker plate 19 is constructed of an X-ray permeable material such as plexiglass, and is provided with four X-ray positive spherical marks 20, which are arranged in the marker plate 19 such that they are situated in different image corners, as disclosed in column 6 lines 53-60, which reads on claimed “said marking elements are arranged in a pattern”.

20. Regarding **claim 13**, Schuetz discloses everything as applied above in regards to claim 9. In addition, Schuetz discloses that the marker plate 19 is constructed of an X-ray permeable material such as plexiglass, as disclosed in column 6 lines 53-60, which reads on claimed “said marking elements are applied to a transparent carrier”.

21. Regarding **claim 18**, Schuetz discloses everything as applied above in regards to claim 1. In addition, Schuetz discloses that the imaged marks 20' can be calculated out of the 2D projections in an image processing step on the basis of the position and size of the imaged marks 20', which are known from the Intrinsic imaging parameters, and on the basis of the known X-ray absorption of the marks 20, as disclosed in column 6 line 63 through column 7 line 2, which reads on claimed “providing the pattern of marking elements with at least of one a size, a shape, and a material that renders the marking elements not visibly evident individually in the image”.

22. Regarding **claim 20**, Schuetz discloses everything as applied above in regards to claim 1. In addition, Schuetz discloses that the imaged marks 20' can be calculated out

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of the 2D projections in an image processing step on the basis of the position and size of the imaged marks 20', which are known from the Intrinsic imaging parameters, and on the basis of the known X-ray absorption of the marks 20, as disclosed in column 6 line 63 through column 7 line 2, which reads on claimed "wherein the marking elements have at least of one a size, a shape, and a material that renders the marking elements not visibly evident individually in the X-ray image".

Claim Rejections - 35 USC § 103

23. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

24. *Claims 2 and 3* are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuetz in view of Seeley et al. (US Patent 6,484,049), hereinafter referenced as Seeley.

25. Regarding **claim 2**, Schuetz discloses everything as applied above in regards to claim 1. In addition, Schuetz discloses that the evaluation of the 2D projections is made by the computer 14, which determines the intrinsic imaging parameters using the known geometric positions of the marks 20 in the second coordinate system K2 and the distance relations of the imaging marks 20' in the 2D projections, which is accomplished by means of suitable pattern detection, as disclosed in column 7 lines 12-20. However, Schuetz fails to disclose exactly how this is done, and more particularly, fails to disclose

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“the position of the marking elements in the image is determined by a correlation of the image with at least one filter image of the pattern of the marking elements”. However, the examiner maintains that it was well known in the art at the time of the invention, as taught by Seeley.

26. In a similar field of endeavor, Seeley discloses a fluoroscopic tracking and visualization system. In addition, Seeley discloses that one suitable protocol takes a candidate marker P_i in image coordinates, assumes it is marker number Q_j of sheet one, and then determines how many other candidate markers support this match, i.e. line up with the expected projections of the remaining markers of one array, as disclosed in column 12 lines 21-33, which reads on claimed “the position of the marking elements in the image is determined by a correlation of the image with at least one filter image of the pattern of the marking elements”.

27. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schuetz, by specifically providing “the position of the marking elements in the image is determined by a correlation of the image with at least one filter image of the pattern of the marking elements”, as taught by Seeley, for the purpose of determining the intrinsic imaging parameters using the known geometric positions of the marks 20 in the second coordinate system K_2 and the distance relations of the imaging marks 20' in the 2D projections by means of suitable pattern detection.

28. Regarding **claim 3**, the combination of Schuetz and Seeley discloses everything as applied above in regards to claim 2. In addition, the combination discloses “the filter image of the pattern is transformed relative to the actual pattern of the marking

elements". Therefore, the examiner maintains that it was well known in the art at the time of the invention, as taught by Seeley.

29. Seeley discloses that that one suitable protocol takes a candidate marker P_i in image coordinates, assumes it is marker number Q_j of sheet one, and then determines how many other candidate markers support this match, i.e. line up with the expected projections of the remaining markers of one array, as disclosed in column 12 lines 21-33, which reads on claimed "the filter image of the pattern is transformed relative to the actual pattern of the marking elements".

30. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schuetz, by specifically providing "the filter image of the pattern is transformed relative to the actual pattern of the marking elements", as taught by Seeley, for the purpose of determining the intrinsic imaging parameters using the known geometric positions of the marks 20 in the second coordinate system K_2 and the distance relations of the imaging marks 20' in the 2D projections by means of suitable pattern detection.

31. *Claim 4* is rejected under 35 U.S.C. 103(a) as being unpatentable over Schuetz in view of Simon et al. (US Patent 6,118,845), hereinafter referenced as Simon.

32. Regarding **claim 4**, Schuetz discloses an X-ray source 9 and X-ray detector 10, as disclosed in column 6 lines 44-46, which reads on claimed "the image is generated by means of radioscopy". Schuetz discloses that should the imaged marks 20' prove disturbing in the 2D projections, the imaged marks 20' can subsequently be calculated

out of the 2D projections in an image processing step, as disclosed in column 6 lines 63-67 and column 7 lines 1-2. However, Schuetz does not disclose how this is done, and more particularly fails to disclose “the marking elements exhibit a low absorption of the X-rays, the effect of which lies within the noise level of the X-ray image”. However, the examiner maintains that it was well known in the art at the time of the invention, as taught by Simon.

33. In a similar field of endeavor, Simon discloses system and methods for the reduction and elimination of image artifacts in the calibration of x-ray imagers. In addition, Simon discloses In addition, Simon discloses that once the offset of a particular image has been determined, processor 303 proceeds with eliminating the artifacts by identifying the calibration marker projections, and, for each identified projection, subtracting the acquired offsets from the pixels of the projection, wherein ideally steps 901-904 will completely eliminate the artifacts from the image while leaving the true underlying image, but practically image noise may prevent a perfect result, as disclosed in column 7 lines 20-29, wherein the calibration markers are semi-transparent, as disclosed in column 7 lines 1-4, which reads on claimed “wherein the image generated by means of radioscopy, and the marking elements exhibit a low absorption of the X-rays, the effect of which lies within the noise level of the X-ray image”.

34. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schuetz, by specifically providing “wherein the image generated by means of radioscopy, and the marking elements exhibit a low absorption of the X-rays, the effect of which lies within the noise level of the X-ray image”, as

taught by Simon, for the purpose of when the imaged marks 20' prove disturbing in the 2D projections, the imaged marks 20' can subsequently be calculated out of the 2D projections in an image processing step.

35. *Claims 5, 14, 15, 16, 17, and 19* are rejected under 35 U.S.C. 103(a) as being unpatentable over Schuetz in view of Erbel et al. (US Patent Application 2002/0122530), hereinafter referenced as Erbel.

36. Regarding **claim 5**, Schuetz discloses everything as applied above in regards to claim 1. However, Schuetz fails to disclose "wherein the position of at least one further object is determined in the image, wherein a second pattern of marking elements, which do not show up individually in the image, is attached to the further object, and wherein the second pattern is different from the first pattern". However, the examiner maintains that it was well known in the art at the time of the invention, as taught by Erbel.

37. In a similar field of endeavor, Erbel discloses a method for producing or updating a radiotherapy plan. In addition, Erbel discloses a computer tomography, wherein a calibration phantom 5 comprises inner marking rods and outer point markers 5 arranged on its bed 6, as disclosed in paragraph 32 and exhibited in figure 4, and further discloses patient marking having the reference numeral 7, as disclosed in paragraph 33 and exhibited in figure 5, which reads on claimed "wherein the position of at least one further object is determined in the image, wherein a second pattern of marking elements, which do not show up individually in the image, is attached to the further object, and wherein the second pattern is different from the first pattern".

38. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schuetz, by specifically providing “wherein the position of at least one further object is determined in the image, wherein a second pattern of marking elements, which do not show up individually in the image, is attached to the further object, and wherein the second pattern is different from the first pattern”, as taught by Erbel, for the purpose of detecting the position of both the bed and the patient.

39. Regarding **claim 14**, Schuetz discloses everything as applied above in regards to claim 1. In addition, Schuetz discloses:

40. obtaining 2D projections with the X-ray detector, as disclosed in column 6 lines 57-63, which reads on claimed “wherein the image is an X-ray”.

41. Schuetz fails to disclose “wherein the pattern of marking elements is remote from an X-ray detector and an X-ray source”. However the examiner maintains that it would have been obvious, in view of Erbel, to provide:

42. Erbel discloses a calibration phantom 5 comprises inner marking rods and outer point markers 5 arranged on its bed 6, as disclosed in paragraph 32 and exhibited in figure 4, which reads on claimed “wherein the pattern of marking elements is remote from an X-ray detector and an X-ray source”.

43. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schuetz, by specifically providing “wherein the pattern of marking elements is remote from an X-ray detector and an X-ray source”, as taught by Erbel, for the purpose of detecting the position of the bed.

44. Regarding **claim 15**, Schuetz discloses everything as applied above in regards to claim 9. Schuetz fails to disclose “wherein the marking device is remote from the X-ray detector and the X-ray source”. However the examiner maintains that it would have been obvious, in view of Erbel, to provide:

45. Erbel discloses a calibration phantom 5 comprises inner marking rods and outer point markers 5 arranged on its bed 6, as disclosed in paragraph 32 and exhibited in figure 4, which reads on claimed “wherein the marking device is remote from the X-ray detector and the X-ray source”.

46. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schuetz, by specifically providing “wherein the marking device is remote from the X-ray detector and the X-ray source”, as taught by Erbel, for the purpose of detecting the position of the bed.

47. Regarding **claim 16**, Schuetz discloses everything as applied above in regards to claim 15. However, Schuetz fails to disclose “another marking device remote from the X-ray detector, the X-ray source and the marking device, wherein the another marking device comprises other marking elements that are not visibly evident individually in the X-ray image, and wherein the another marking device is attached to a patient adjacent to the object”. However, the examiner maintains that it was well known in the art at the time of the invention, as taught by Erbel.

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48. Erbel discloses a calibration phantom 5 comprises inner marking rods and outer point markers 5 arranged on its bed 6, as disclosed in paragraph 32 and exhibited in figure 4, and further discloses patient marking having the reference numeral 7, as disclosed in paragraph 33 and exhibited in figure 5, which reads on claimed “another marking device remote from the X-ray detector, the X-ray source and the marking device, wherein the another marking device comprises other marking elements that are not visibly evident individually in the X-ray image, and wherein the another marking device is attached to a patient adjacent to the object”.

49. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schuetz, by specifically providing “another marking device remote from the X-ray detector, the X-ray source and the marking device, wherein the another marking device comprises other marking elements that are not visibly evident individually in the X-ray image, and wherein the another marking device is attached to a patient adjacent to the object”, as taught by Erbel, for the purpose of detecting the position of the patient relative to the bed.

50. Regarding **claim 17**, Schuetz discloses everything as applied above in regards to claim 1. However, Schuetz fails to disclose “wherein the pattern of marking elements are not visibly evident individually in the image without performing an image processing step to remove the pattern from the image”. However, the examiner maintains that it would have been obvious, in view of Erbel, to provide:

51. Erbel discloses a calibration phantom 5 comprises inner marking rods and outer point markers 5 arranged on its bed 6, as disclosed in paragraph 32 and exhibited in figure 4, and further discloses patient marking having the reference numeral 7, as disclosed in paragraph 33 and exhibited in figure 5, wherein a first patient data set is recorded , and then the patient is positioned such that the recording range 8 enters the image detection range of the computer tomograph, and because of the calibration described above, the markings 7 do not also have to be in the image detection range or recording range for exact positioning, as disclosed in paragraph 33, which reads on claimed “wherein the pattern of marking elements are not visibly evident individually in the image without performing an image processing step to remove the pattern from the image”.

52. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schuetz, by specifically providing “wherein the pattern of marking elements are not visibly evident individually in the image without performing an image processing step to remove the pattern from the image”, as taught by Erbel, for the purpose of detecting the position of the patient relative to the bed, wherein the marking elements necessary to do this are not in the recording range after the first patient data set so that the markings do not affect the image.

53. Regarding **claim 19**, Schuetz discloses everything as applied above in regards to claim 9. However, Schuetz fails to disclose “wherein the marking elements are not visibly evident individually in the image without performing an image processing step to

remove the pattern from the image”. However, the examiner maintains that it would have been obvious, in view of Erbel, to provide:

54. Erbel discloses a calibration phantom 5 comprises inner marking rods and outer point markers 5 arranged on its bed 6, as disclosed in paragraph 32 and exhibited in figure 4, and further discloses patient marking having the reference numeral 7, as disclosed in paragraph 33 and exhibited in figure 5, wherein a first patient data set is recorded , and then the patient is positioned such that the recording range 8 enters the image detection range of the computer tomograph, and because of the calibration described above, the markings 7 do not also have to be in the image detection range or recording range for exact positioning, as disclosed in paragraph 33, which reads on claimed “wherein the marking elements are not visibly evident individually in the image without performing an image processing step to remove the pattern from the image”.

55. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schuetz, by specifically providing “wherein the marking elements are not visibly evident individually in the image without performing an image processing step to remove the pattern from the image”, as taught by Erbel, for the purpose of detecting the position of the patient relative to the bed, wherein the marking elements necessary to do this are not in the recording range after the first patient data set so that the markings do not affect the image.

56. *Claim 12* is rejected under 35 U.S.C. 103(a) as being unpatentable over Schuetz in view of Close et al. (US Patent 5,774,521), hereinafter referenced as Close.

57. Regarding **claim 12**, Schuetz discloses everything as applied above in regards to claim 11. However, Schuetz fails to disclose “said pattern is a two-dimensional, cyclical binary maximum-length sequence”. However, the examiner maintains that it was well known in the art at the time of the invention, as taught by Close.

58. In a similar field of endeavor, Close discloses a regularization technique for densitometric correction. In addition, Close discloses that in the preferred embodiment, the calibration phantom is designed such that the phantom density is spatially uncorrelated to the subject density, wherein in the preferred embodiment, the phantom density is a constant term plus uncorrelated Gaussian distributed random noise, having a flat power spectrum of spatial frequencies and nearly uniform local variance, and thus the noise at each pixel of the phantom is preferably a random number having a Gaussian distribution and a variance that is uniform for all pixels, as disclosed in column 5 lines 55-67, and column 6 lines 1-2, which reads on claimed “said pattern is a two-dimensional, cyclical binary maximum-length sequence”, since the two-dimensional, cyclical binary maximum-length sequence is used because of its good correlation behavior, and is thus equivalent to the method disclosed by Close.

59. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify Schuetz, by specifically providing “said pattern is a two-dimensional, cyclical binary maximum-length sequence”, as taught by Close, for the purpose of having the calibration phantom being designed such that the phantom density is spatially uncorrelated to the subject density.

Response to Arguments

60. Applicant's arguments filed February 4th, 2008 have been fully considered but they are not persuasive.

61. Regarding applicant's argument that Schuetz fails to disclose or suggest "providing a pattern of marking elements that are not visibly evident individually in the image and attaching the pattern of marking elements to the object that is being imaged", the examiner respectfully disagrees. Specifically, the examiner maintains that the "pattern of marking elements" (marker plate 19 provided with marks 20 in column 6 lines 44-63) are "not visibly evident individually in the image" (the imaged marks 20' can be calculated out of the 2D projections in an image processing step in column 6 line 63 through column 7 line 2). In addition, the examiner maintains that Schuetz provides "attaching the pattern of marking elements to the object that is being imaged" since, as disclosed in column 6 lines 44-64, the marker plate 19, provided with marks 20, is arranged directly at the X-ray source 9; the X-ray source 9, reading on "the object", is being imaged by the X-ray detector 10.

62. Regarding applicant's argument that Schuetz fails to disclose or suggest "at least one marking device for attachment to an object in order to determine the position of the object in an X-ray image", the examiner respectfully disagrees. Specifically, the examiner maintains that Schuetz discloses in column 6 lines 44-64, that the marker plate 19, provided with marks 20, is arranged directly at the X-ray source 9 (the X-ray source 9 reading on "the object"), wherein the distance of the X-ray source 9 from the X-

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ray detector 10, the orientation of the X-ray source 9 relative to the X-ray detector 10, and a possible displacement of the X-ray detector 10 perpendicular to the axis of the center beam ZS of the X-ray beam emanating from the X-ray source 9, are detected using the marker plate 19, which reads on “at least one marking device for attachment to an object in order to determine the position of the object in an X-ray image”.

63. Regarding applicant's arguments as to the dependent claims, the examiner respectfully disagrees for the reasons cited above.

Citation of Pertinent Prior Art

64. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

65. Falconer et al. (US Patent 5,572,433) discloses calculating displacement of a moving web by calculating a correlation of watermarks on the moving web (see column 18 lines 45-59).

Conclusion

66. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

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TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DANIEL ZEILBERGER whose telephone number is (571)270-3570. The examiner can normally be reached on M-F 8:30-6pm est (alternate Fridays off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Vikkram Bali can be reached on (571)272-7415. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Daniel Zeilberger
Examiner
Art Unit 2624

DZ
04/09/2008

/Vikkram Bali/
Supervisory Patent Examiner, Art Unit 2624